NOV 2 0 2003

REPLACEMENT SHEET
APPLN. FILING DATE: JULY 18, 2003
TITLE: METHOD AND APPARATUS FOR AUTOMATIC OBJECT

IDENTIFICATION

INVENTOR(S): MELISSA WIEDEMANN, ET AL. APPLICATION SERIAL NO: 10/622,144

SHEET 1 of 33

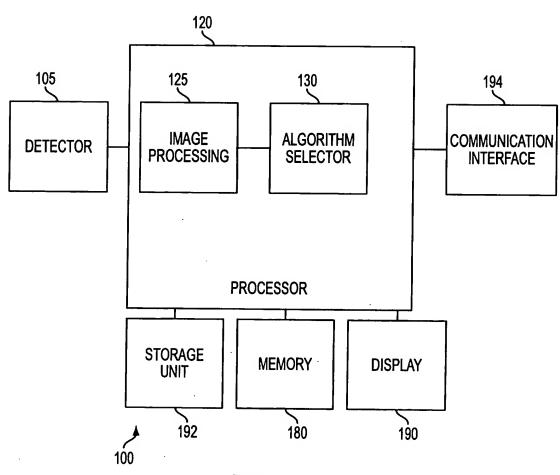
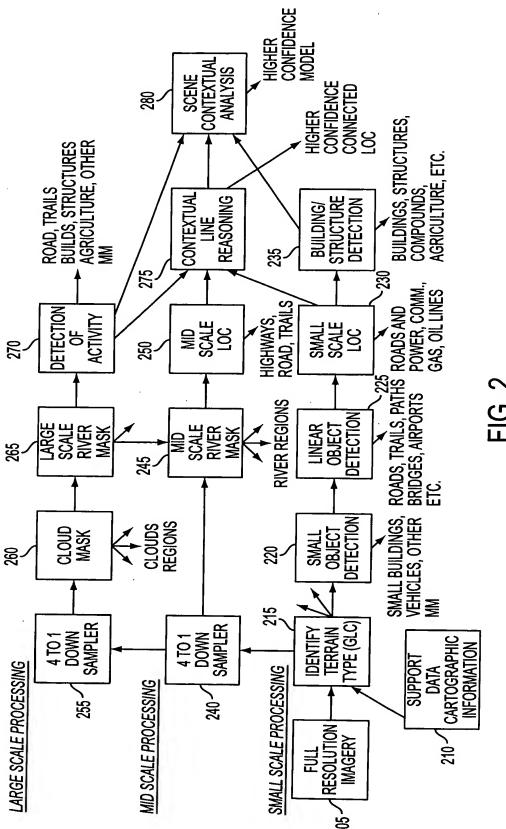


FIG. 1

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IDENTIFICATION

Inventor(s): Melissa WIEDEMANN, et al.

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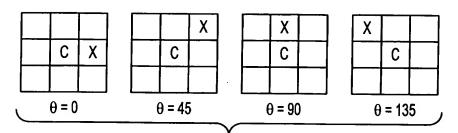


FIG. 3

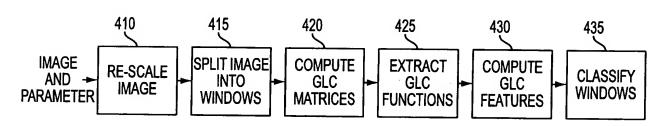


FIG. 4

ENERGY
$$En = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} (G(i,j))^{2}$$
ENTROPY
$$Et = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} (G(i,j) \log(G(i,j)))$$
CONTRAST
$$Ct = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} (G(i,j) \times (i-j)^{2})$$
INVERSE_DIFFERENCE_MOMENT
$$En = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} \frac{G(i,j)}{1 + (i-j)^{2}}$$
CORRELATION
$$Cr = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} \frac{i \times j \times G(i,j) - \mu_{X} \times \mu_{Y}}{\sigma_{X} \times \sigma_{Y}}$$

FIG. 5

REPLACEMENT SHEET APPLN. FILING DATE: JULY 18, 2003 TITLE: METHOD AND APPARATUS FOR AUTOMATIC OBJECT **IDENTIFICATION** INVENTOR(S): MELISSA WIEDEMANN, ET AL. APPLICATION SERIAL No: 10/622,144 SHEET 4 f 33 REPLACEMENT SHEET **IMAGE AT A IMAGE WITH A DOWNSAMPLE** 605 / FIRST RESOLUTION THIRD **IMAGE** - RESOLUTION 610 **PRIMITIVE** LINE **BUSY MASK EXTRACTION EXTRACTION** 625 630 DETERMINE **FEATURE SEGMENTATION BACKGROUND & EXTRACTION MERGE REGIONS** 640 645 **CLOUD BANK** CLOUD **CLASSIFICATION IDENTIFICATION** REFINEMENT 655 -660 FIG. 6 **IMAGE WITH A** FIRST RESOLUTION 2:1 2:1 2:1 **DOWNSAMPLING DOWNSAMPLING DOWNSAMPLING** 1ST 2ND ... REDUCED ... nTH RESOLUTION **IMAGE** 750 755 760 765 LOW PASS **DOWNSAMPLE** LOW PASS DOWNSAMPLE FILTER IN IN FILTER IN IN **X DIRECTION** X DIRECTION Y DIRECTION Y DIRECTION 2:1 DOWNSAMPLING FIG. 7A 1 4 6 1 6 16 24 16 1 X DIRECTION FILTER 24 36 24 1 4 16 24 16 1 1 6 **FULL 6 BY 6 CONVOLUTION FILTER** Y DIRECTION FILTER)

FIG. 7B

620

635 -

650 ·

FIG. 7C

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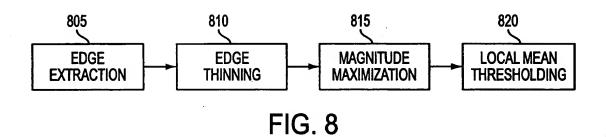
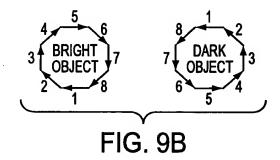


FIG. 9A



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DIRECTIONS 3 & 7	DIRECTIONS 1 & 5	DIRECTIONS 2 & 6	DIRECTIONS 4 & 8
00000	OXXXO	000X0	0 X O O O
XOOOX	00X00	000XX	XXOOO
XXCXX	00000	00000	00000
XOOOX	00X00	XXOOO	000XX
00000	OXXXO	0 X O O O	000X0

C = CENTER PIXEL

X = NON-ZERO PIXEL O = DON'T CARE PIXEL

FIG. 10

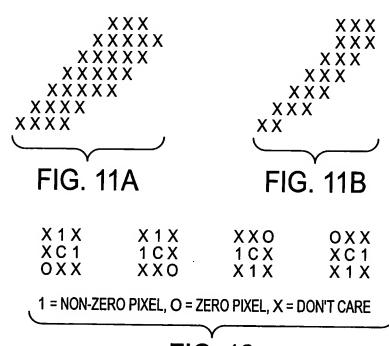
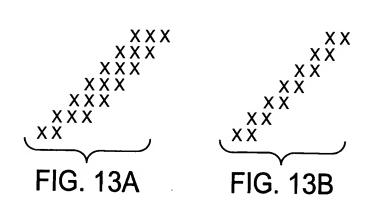


FIG. 12



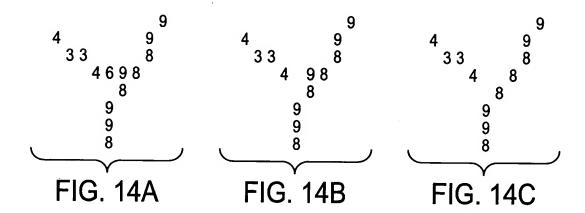
APPLN. FILING DATE: JULY 18, 2003

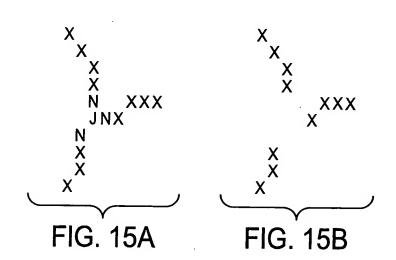
TITLE: METHOD AND APPARATUS FOR AUTOMATIC OBJECT

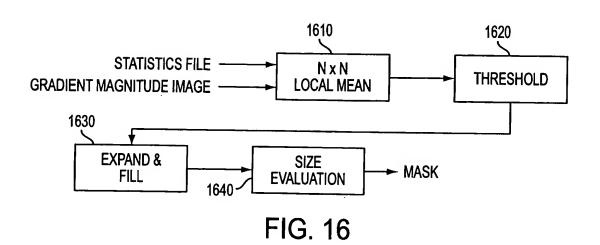
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INVENTOR(S): MELISSA WIEDEMANN, ET AL.

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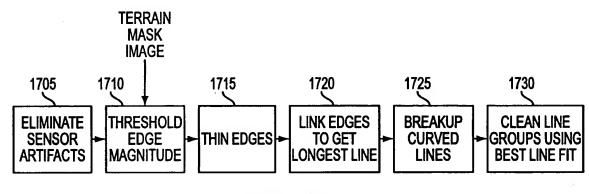
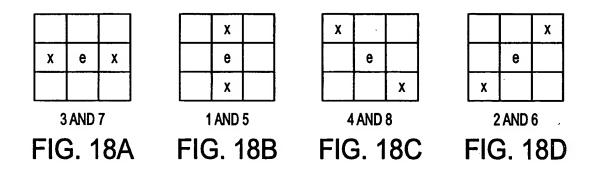
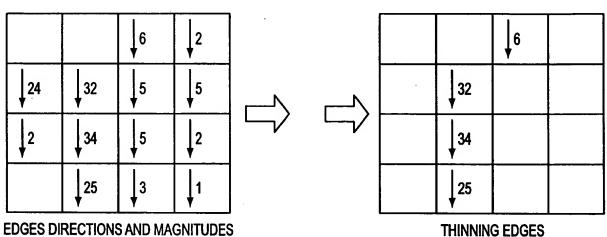


FIG. 17





EDGES DIRECTIONS AND MAGNITUDES

FIG. 19A

FIG. 19B

DIRECTION 1 = DIRECTION 1 AND DIRECTION 2 DIRECTION 2 = DIRECTION 2 AND DIRECTION 3 DIRECTION 3 = DIRECTION 3 AND DIRECTION 4 DIRECTION 4 = DIRECTION 4 AND DIRECTION 5 DIRECTION 5 = DIRECTION 5 AND DIRECTION 6 DIRECTION 7 = DIRECTION 7 AND DIRECTION 8 DIRECTION 6 = DIRECTION 6 AND DIRECTION 7 DIRECTION 8 = DIRECTION 8 AND DIRECTION ∞ FIG. 20B **NOISE PRESENT** 2 ∞ ∞ ∞ ∞ ~ ည ∞ ∞ ~ ∞ FIG. 20A NO NOISE PRESENT ∞ က ∞ ∞ \sim REGIONS -A) NON-OVERLAPPING REGION B) NON-OVERLAPPING REGION DIRECTION

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FIG. 21A



FIG. 21B

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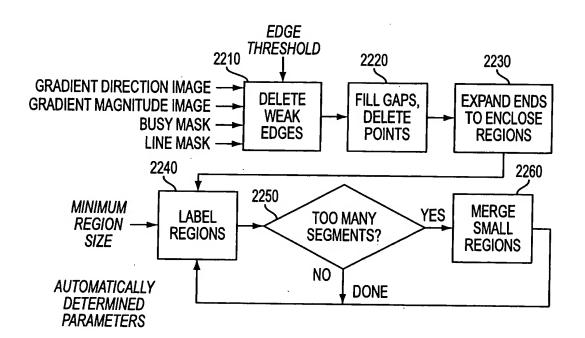


FIG. 22

E E O	OEE	OEO	O E O	
O C O	OCO	OCO	O C O	
O E O	OEO	EEO	O E E	
TEM	PLATES FOR VE	RTICAL POINT	GAP	
C = CENTER PIXEL, VALU	JE 1 E = PIXE	L VALUE 1	O = ZERO PIXEL VALU	E
E O O	O O E	O O O	0 0 0	J
E C E	E C E	E C E	E C E	
O O O	O O O	E O O	O 0 E	
TEMPL	ATES FOR HOR	IZONTAL POIN	I GAP	

FIG. 23

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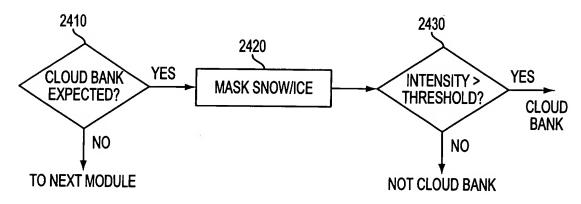


FIG. 24

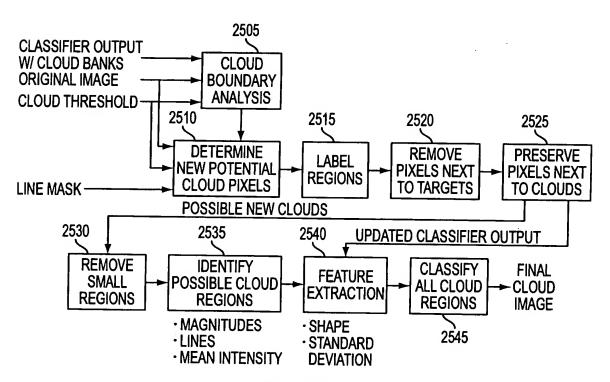


FIG. 25

APPLN. FILING DATE: JULY 18, 2003

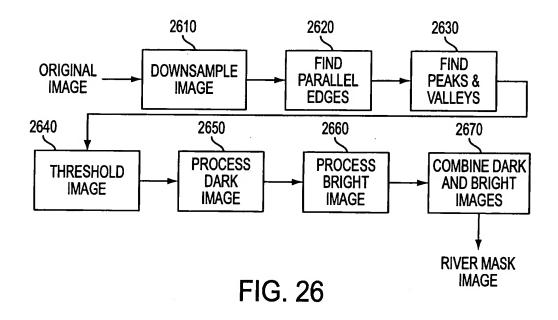
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INVENTOR(S): MELISSA WIEDEMANN, ET AL.

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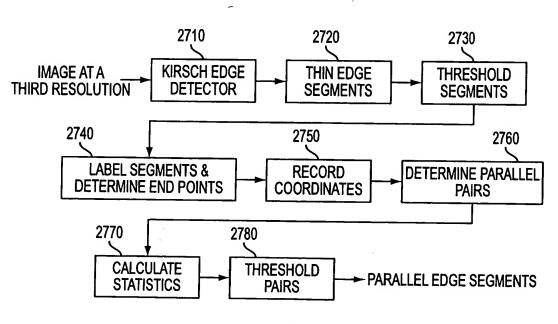


FIG. 27

APPLN. FILING DATE: JULY 18, 2003

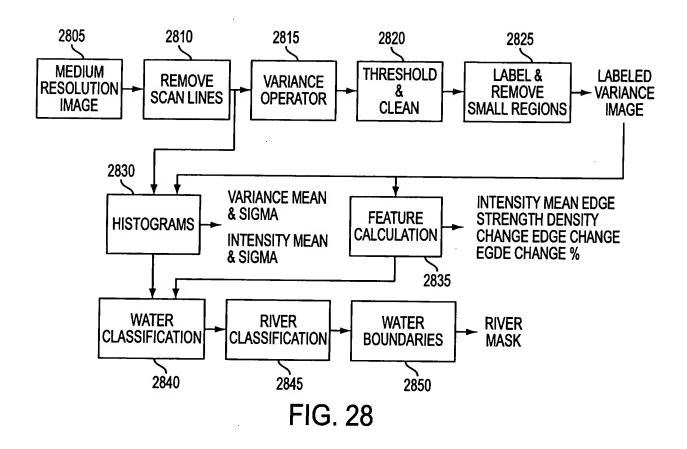
TITLE: METHOD AND APPARATUS FOR AUTOMATIC OBJECT

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a-1,-1 a0,-1 a1,-1 a-1,0 a0,0 a1,0 a-1,1 a0,1 a1,1 3 BY 3 NEIGHBORHOOD	$\sigma = \frac{1}{n} \sum_{j=-k}^{k} \sum_{i=-k}^{k} (a_{ij} - \mu)^{2}$ $WHERE$ $\mu = \frac{1}{n} \sum_{i=-k}^{k} (a_{ij})$
FIG. 29A	3 BY 3 NEIGHBORHOOD k =1 FIG. 29B

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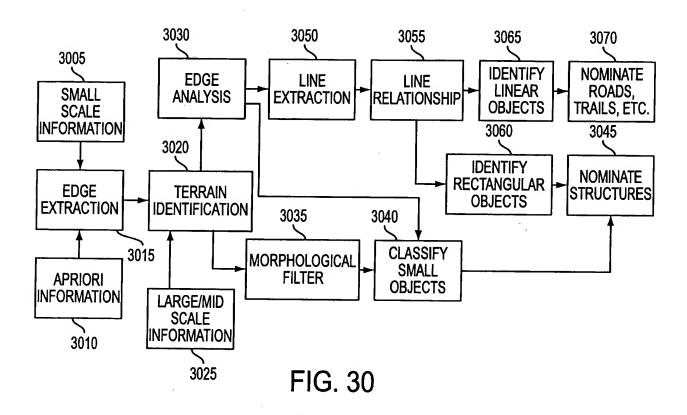
TITLE: METHOD AND APPARATUS FOR AUTOMATIC OBJECT

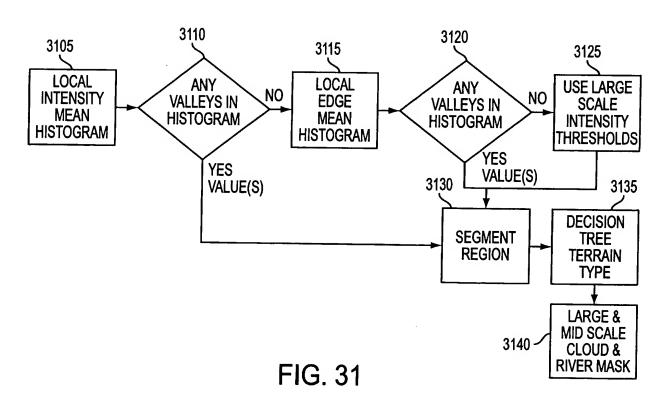
IDENTIFICATION

INVENTOR(S): MELISSA WIEDEMANN, ET AL.

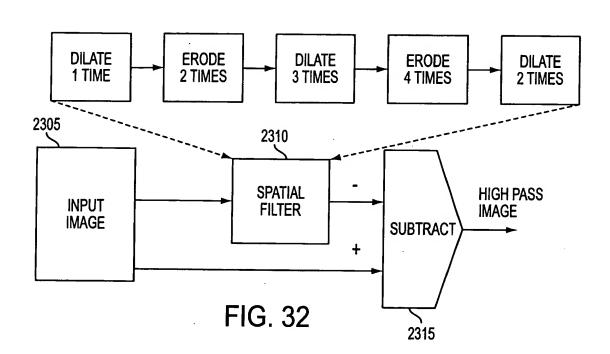
APPLICATION SERIAL NO: 10/622,144

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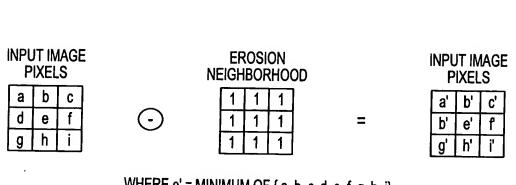
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WHERE $e' = MAXIMUM OF \{a, b, c, d, e, f, g, h, i\}$

FIG. 33A



WHERE $e' = MINIMUM OF \{ a, b, c, d, e, f, g, h, i \}$

FIG. 33B

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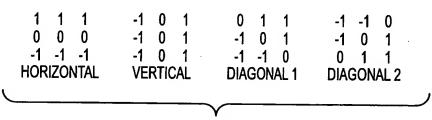


FIG. 34A

	HORIZ	ONTAL	VER.	TICAL	DIAGO	DNAL 1		DIAGO	NAL 2
GRADIENT SIGN	+	-	+	-	+	-	•	+	-
DIRECTION	1	5	3	7	2	6	-	4	8
)
				<u> </u>					

FIG. 34B

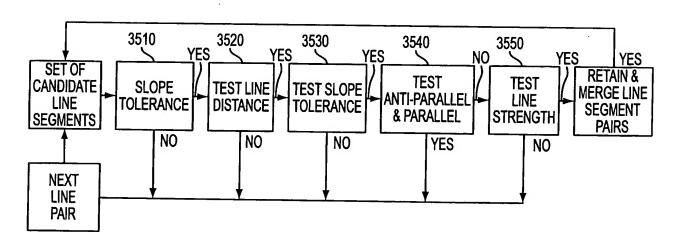


FIG. 35

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LINE PAIR **TERRAIN** 3635 ~ **TYPE** 3610 3620 3630 3640 3660 3650 YES YES YES **YES** YES SET OF **LABEL AS TEST TEST TEST** CANDIDATE TEST SLOPE TEST LINE MEMBER OF **OVERLAP** ANTI-PARALLEL LINE LINE TOLERANCE **DISTANCE** PARALLEL **TOLERANCE** & PARALLEL STRENGTH **SEGMENTS** LINE GROUP NO NO NO NO NO **GET NEXT** LINE PAIR

FIG. 36

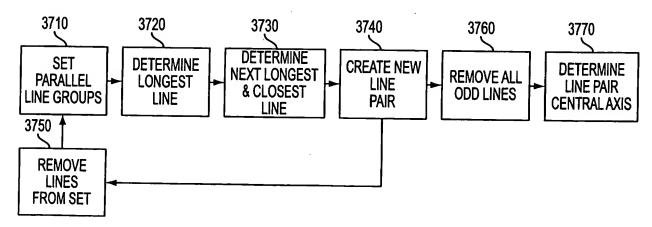


FIG. 37

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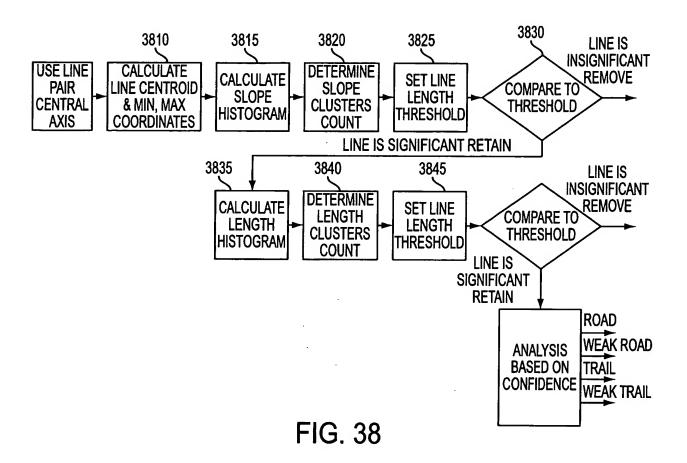
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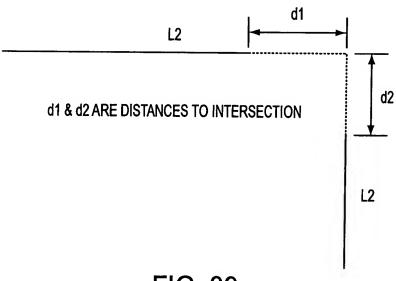


FIG. 39

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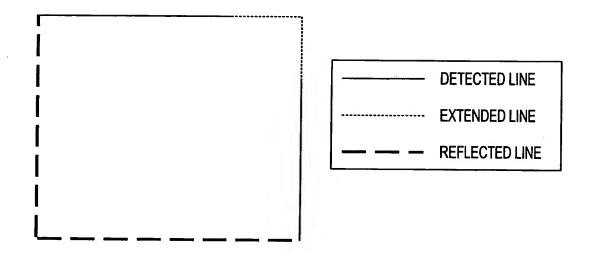
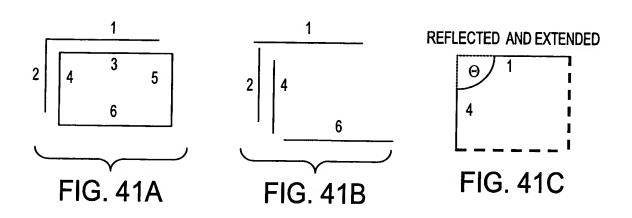


FIG. 40

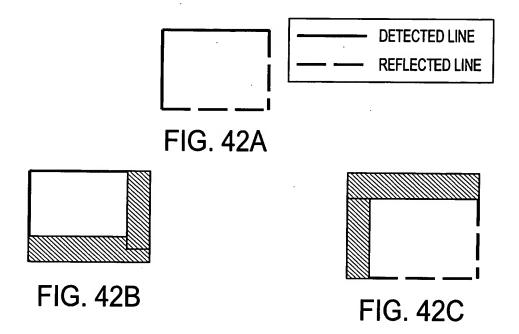


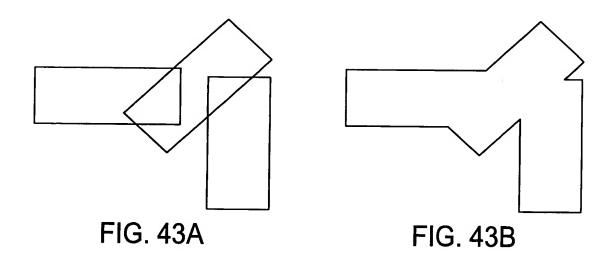
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INVENTOR(S): MELISSA WIEDEMANN, ET AL. APPLICATION SERIAL NO: 10/622,144

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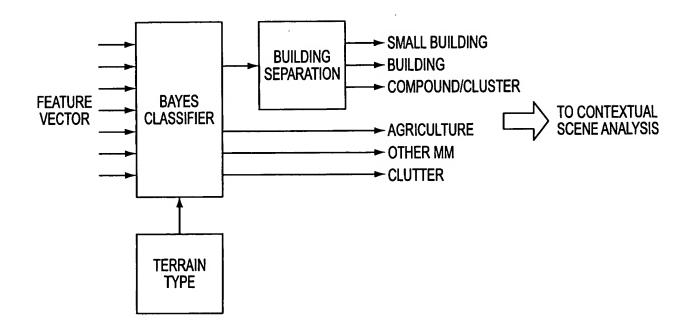


FIG. 44

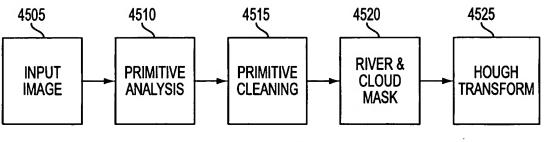


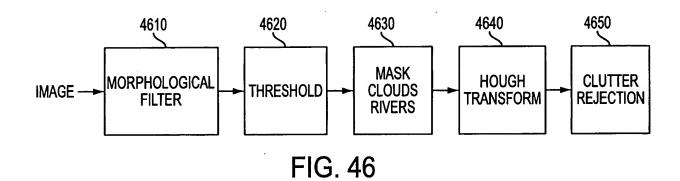
FIG. 45

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Inventor(s): Melissa WIEDEMANN, et al. Application Serial No: 10/622,144

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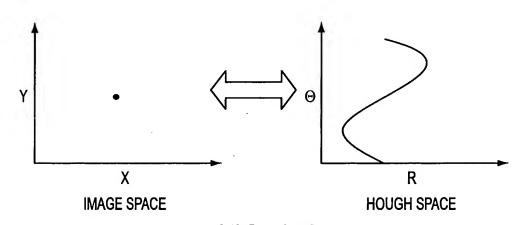


FIG. 47A

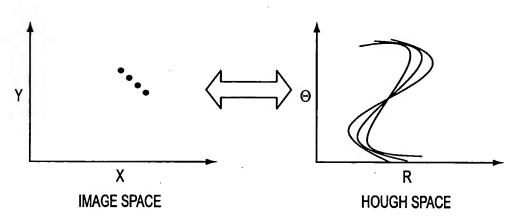


FIG. 47B

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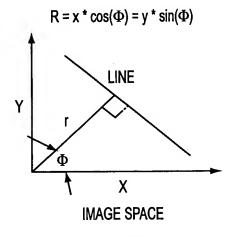


FIG. 48

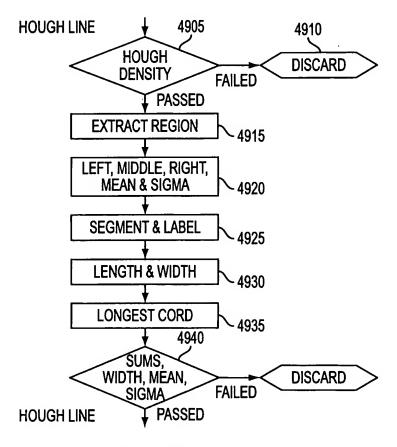


FIG. 49

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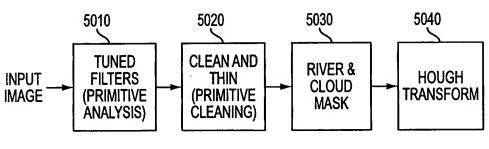


FIG. 50

A1	0	B1	0	C1	
A2	0	B2	0	C2	
A3	0	B3	0	C3	
A4	0	B4	0	C4	
A5	0	B5	0	C5	
A6	0	B6	0	C6	
A7	0	B7	0	C7	
A8	0	B8	0	C8	
A9	0	В9	0	C9	
A10	0	B10	0	C10	
A11	0	B11	0	C11	$P_{1} = 2 \times \sum_{i=1}^{15} P_{1} \left(\sum_{i=1}^{15} A_{i+1} \sum_{i=1}^{15} C_{i} \right)$
A12	0	B12	0	C12	$B_8 = 2 \times \sum_{i=1}^{15} B_i - \left(\sum_{i=1}^{15} A_i + \sum_{i=1}^{15} C_i \right)$
A13	0	B13	0	C13	
A14	0	B14	0	C14	
A15	0	B15	0	C15	

FIG. 51

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A1	A2	A3	A4	A5
A16	B1	B2	В3	A6
A15	B4	B5	B6	A7
A14	В7	B8	В9	A8
A13	A12	A11	A10	A9

FIG. 52

	X	X	X X X X	X X X X X X X X X X	X X X X	X
Х	Х	X	x x x	х	х	
Χ	X	Х	x x x	x x x	X X	
		Х	x x		Х	X

FIG. 53

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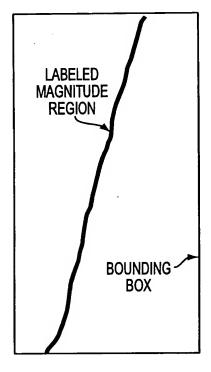


FIG. 54

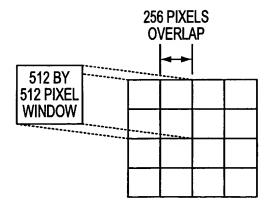


FIG. 55

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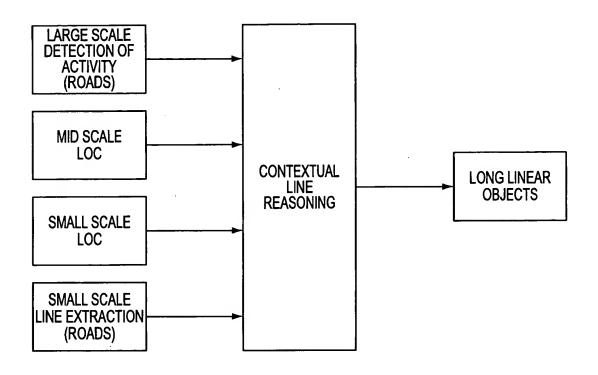


FIG. 56

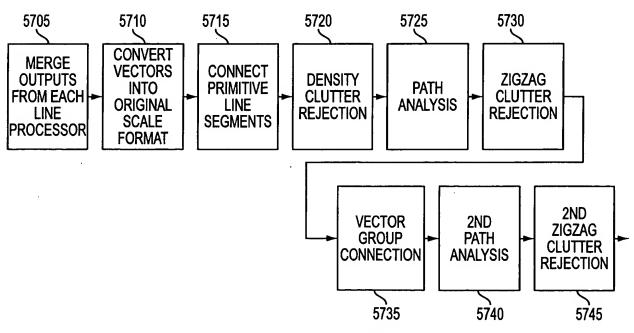


FIG. 57

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IDENTIFICATION

INVENTOR(S): MELISSA WIEDEMANN, ET AL.

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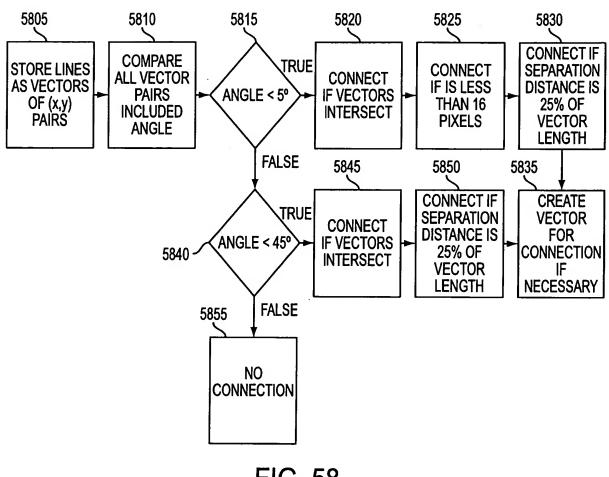
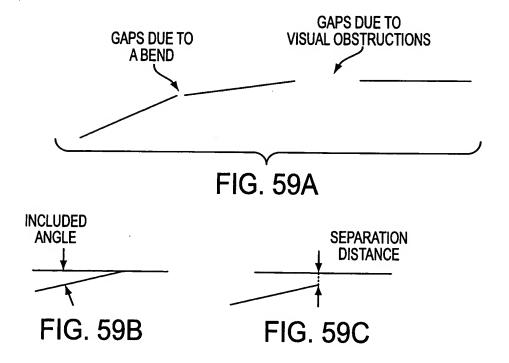


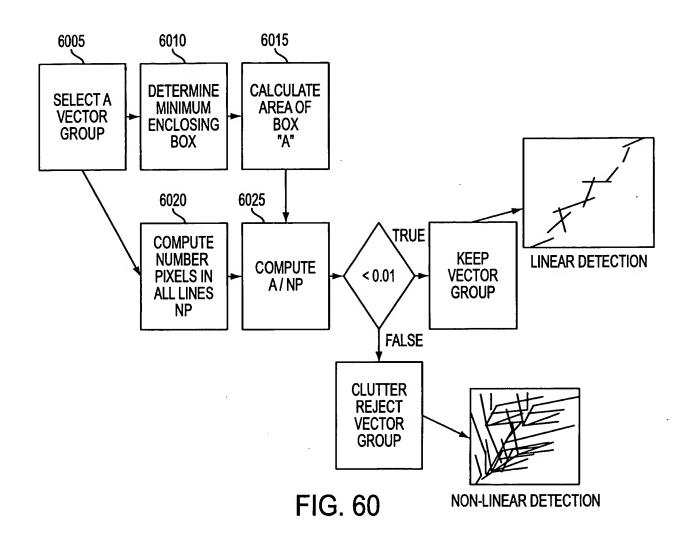
FIG. 58



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$$M^1 = \|m_{ij}^1\|$$
 Where m_{ij}^1 is the direct distance

Between node i and j in pixels

 $M^2 = \|m_{ij}^2\|$ Where m_{ij}^2 is the direct distance

Between node i and j in pixels using a most one intermediate node

 $M^2 = M^1 \otimes M^1$
 $M^4 = M^2 \otimes M^2$

In General the following is true

 $M^{n+m} = M^n \otimes M^m$

When $M^t = M^{t+\alpha}$ where α is a positive number all paths are connect

FIG. 61

REPLACEMENT SHEET
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INVENTOR(S): MELISSA WIEDEMANN, ET AL.

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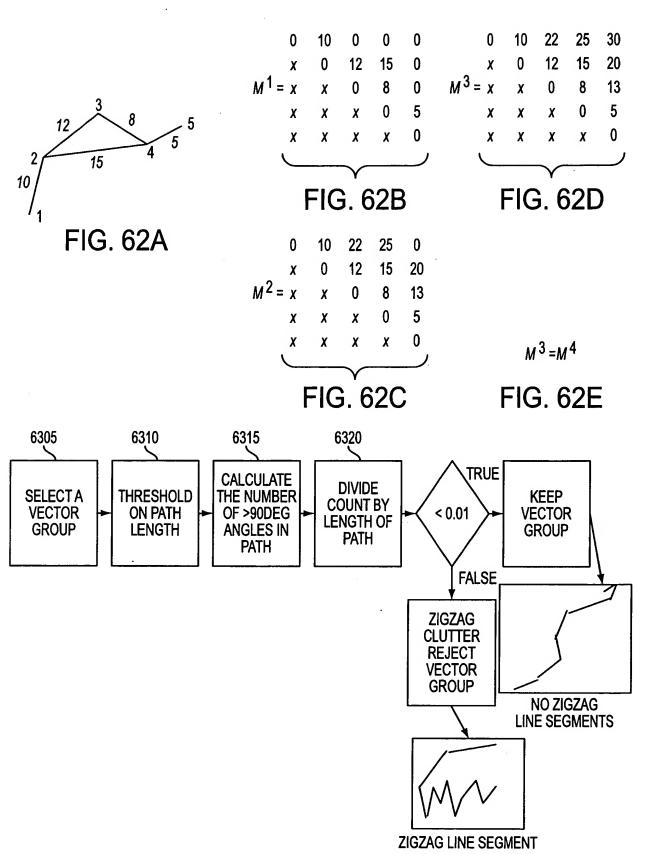


FIG. 63

REPLACEMENT SHEET APPLN. FILING DATE: JULY 18, 2003

TITLE: METHOD AND APPARATUS FOR AUTOMATIC OBJECT

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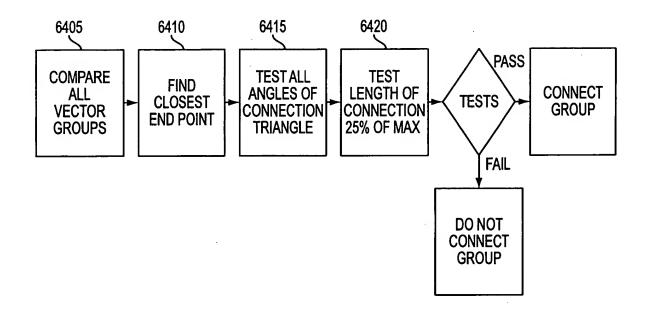


FIG. 64

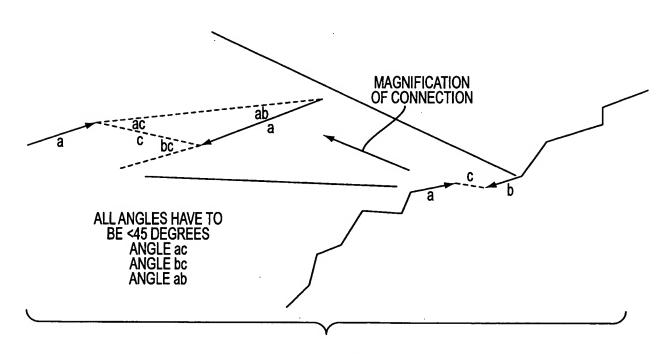


FIG. 65

APPLN. FILING DATE: JULY 18, 2003
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INVENTOR(S): MELISSA WIEDEMANN, ET AL.
APPLICATION SERIAL NO: 10/622,144

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